

WHAT IS CLAIMED IS:

1. An information transmission network system comprising:
  - a plurality of node units each accommodating at least one lower-tier terminal, and
  - 5 service transmission lines and protection transmission lines interconnecting said node units;
  - wherein said node units comprise:
    - a normal operating means for transmitting information in the main traffic by setting a main traffic communication path in said service transmission lines and transmits information in the sub-traffic by setting a sub-traffic communication path, if necessary, in said protection transmission lines,
    - 10 a failure detection means for detecting failure in said service transmission lines, and
    - 15 a backup operating means for inserting a predetermined signal, when a failure has been detected by said detection means, at every exit to lower-tier terminals substantially connected to said protection transmission lines and then switches the main traffic communication path set in the failed service transmission lines to said protection transmission lines.
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    - 25 2. The information transmission network system according to claim 1, wherein the backup operating means in said node units inserts a first predetermined

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signal at the exit to lower-tier terminals where said  
sub-traffic communication path is set and inserts a  
second predetermined signal, which is different from  
said first predetermined signal, at the exit to lower-  
tier terminals where no sub-traffic communication path  
is set.

3. The information transmission network system  
according to claim 2, wherein the backup operating  
means in said node units inserts the AU-AIS signal  
(Administrative Unit-Alarm Indication Signal) as said  
first predetermined signal and the UNEQ (Unequipped)  
signal as said second signal, when said information  
transmission network system has a configuration  
conforming to SDH (Synchronous Digital Hierarchy).

4. A traffic control method for use in network  
systems having a plurality of node units each  
accommodating at least one lower-tier terminal and  
service transmission lines and protection transmission  
lines interconnecting said node units, comprising:

a step of detecting failure in said service  
transmission lines;  
a step of normal operation that, when no failure  
is detected in said failure detection step, transmits  
information in the main traffic by setting a main  
traffic communication path in said service transmission  
lines and transmits information in the sub-traffic by  
setting a sub-traffic communication path, if necessary,

in said protection transmission lines;

a step of backup operation that, when a failure is detected in said failure detection step, inserts a predetermined signal at the exit to lower-tier terminals substantially connected to said protection transmission lines; and

5 a step of switching the main traffic communication path set in the failed service transmission lines to said protection transmission lines, after said predetermined signal has been inserted.

10 5. The traffic control method according to claim 4, wherein said step of inserting a predetermined signal comprises:

15 a step of checking the protection transmission lines corresponding to the service transmission lines where a failure has been detected in said failure detection step for any sub-traffic communication path; and

20 a step of inserting a predetermined signal that, when a sub-traffic communication path is detected in said failure detection step, inserts a first predetermined signal at the exit of the sub-traffic communication path to lower-tier terminals, and when no sub-traffic communication path is detected in said failure detection step, inserts a second predetermined signal at the exit to lower-tier terminals substantially connected to said protection transmission lines.

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6. The traffic control method according to  
claim 5, wherein said steps of inserting a  
predetermined signal inserts the AU-AIS signal  
(Administrative Unit-Alarm Indication Signal) as said  
5 first predetermined signal and the UNEQ (Unequipped)  
signal as said second predetermined signal, when said  
information transmission network system has a  
configuration conforming to SDH (Synchronous Digital  
Hierarchy).

10       7. In node units for use in information  
transmission network systems that have a plurality of  
node units each accommodating at least one lower-tier  
terminal, connect node units with service transmission  
lines and protection transmission lines, during normal  
operations, carry main traffic information through a  
15 main traffic communication path set in said service  
transmission lines, and carry sub-traffic information  
through a sub-traffic communication path, if necessary,  
set in said protection transmission lines,  
the node unit comprising:  
20            a transmitted information exchange unit that  
transmits and receives information through a  
predetermined communication path selectively between  
said service transmission lines and protection  
25 transmission lines;  
                at least one interface unit for said lower-tier  
terminals that is each mounted in said at least one

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lower-tier terminal and transmits and receives information between the corresponding lower-tier terminals and said transmitted information exchange unit; and

5           a control unit that monitors said service transmission lines and protection transmission lines for failure, and, upon the detection of failure in said service transmission lines, terminates the communication path substantially connected to said protection  
10          transmission lines by making said interface unit for lower-tier terminals send predetermined signals to lower-tier terminals and then makes said transmitted information exchange unit switch the main traffic communication path to the protection transmission lines.

15          8. The node units according to claim 7, wherein said control unit has:

a sub-traffic communication path detection means for checking the protection transmission lines corresponding to the service transmission lines where a  
20          failure has been detected in said failure detection step for any sub-traffic communication path; and

25          a predetermined signals insertion means for making the interface unit for lower-tier terminals that serves as the exit of the corresponding path to lower-tier terminals send a first predetermined signal to lower-tier terminals when a sub-traffic communication path is detected by said detection means, and for making the

interface unit for lower-tier terminals that serves as the exit to lower-tier terminals substantially connected to said protection transmission lines send a second predetermined signal to lower-tier terminals when no sub-traffic communication path is detected.

9. The node unit according to claim 8, wherein said predetermined signal insertion means sends the AU-AIS signal (Administrative Unit-Alarm Indication Signal) as said first predetermined signal and the UNEQ (Unequipped) signal as said second signal, when said information transmission network system has a configuration conforming to SDH (Synchronous Digital Hierarchy).

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